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(72) Inventors: VLADIMÍR KUDA
VLADIMÍR VAŠÍČEK
BOŘIVOJ SUCHÁNEK

(54) A METHOD OF GUIDING WEFT YARN AND A COMB FOR CARRYING OUT THE METHOD

(71) We, VÝZKUMNÝ A VÝVOJOVÝ ÚSTAV ZÁVODŮ VŠEOBECNÉHO STROJÍRENSTVÍ, of 76 Gottwaldova, Brno, Czechoslovakia, a Corporate body organised and existing under the laws of Czechoslovakia, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be peformed, to be particularly described in and by the following statement:–

The present invention relates to a method of guiding weft yarn through a shed by means of a weft guiding comb in a jet weaving loom and a weft guiding comb for carrying out the method.

In known jet weaving looms, the weft yarn is inserted through the shed by means of an entraining medium flow discharged from a suitably arranged nozzle. The flow with the weft yarn to be inserted is directed by the weft guiding comb, the teeth of which at the moment of weft inserting enter the shed via the lower warp thread sheet. Each tooth is provided with a weft inserting opening with a directing profile and an unthreading gap.

The disadvantage of jet insertion consists in that with increasing width of the weaving loom the range of the entraining medium flow drops, thus causing a weft insertion of inferior quality at more distant points. This method of weft insertion is suitable only for weaving in looms of narrow and medium widths.

Further, various so-called active weft yarn insertion devices are known, in which between so-called passive teeth are interposed active teeth with auxiliary discharging medium outlets, by means of which the insertion flow is accelerated. One such device is shown in our UK Patent No. 1,424,703. However during the weft insertion process, in these active devices it is usually found that the weft yarn to be inserted is influenced by the auxiliary outlets in such a way that the weft yarn is caused to oscillate about the whole cross section of the weft inserting openings of the comb orifices. The result is that the weft yarn to be inserted also comes into the range of the unthreading gap, so that weft defects are frequently caused.

The prevention of escaping through the unthreading gap of the weft insertion comb orifices of a weft yarn is performed by mechanical closing of this gap, suitably by means of a resilient diaphragm. However, this solution has only a limited application, particularly when using fine weft yarns, and its construction may be very complicated.

It is an object of the present invention to reduce the aforesaid disadvantages. According to the present invention there is provided a method of guiding weft yarn through a shed by means of weft guiding comb in a jet weaving loom, in which said weft yarn is projected by a primary flow into the guiding comb, formed of an array of elements provided with weft inserting openings and with unthreading gaps and which is further, in the course of its advancement through said weft inserting openings of the comb elements directed by means of a secondary flow, wherein at least a part of the weft yarn to be inserted is directed by the secondary flow, upon its movement through the weft inserting openings of the elements of the comb, into a zone of the weft inserting openings opposite to the unthreading gaps and towards the inner extremity of the weft inserting openings.

The invention also consists in a weft guiding comb for a jet weaving loom for carrying out the method in the previous paragraph, the comb comprising an array of elements provided with weft inserting openings and with unthreading gaps, means for forming a secondary flow so that at least a part of the weft yarn is directed by the secondary flow,

upon its movement through the weft inserting openings of the elements, into a zone of the weft inserting openings opposite to the unthreading gaps and toward the inner extremity of the weft inserting openings.

A further feature of the weft inserting orifice comb according to the present invention consists in that at least one of its active elements is provided with auxiliary outlets the axes of which intersect beyond, in a direction away from the unthreading gaps, a further plane parallel to the axis of the comb, which further plane passes through the auxiliary outlets.

The weft guiding comb may have at least one of its active teeth provided with auxiliary outlets, the axes of which intersect each other beyond a plane parallel to the axis of the weft guiding comb and including the connecting line of two auxiliary outlets furthest from the ends of its unthreading gap, in the direction away from the unthreading gaps of the comb.

The axes of the auxiliary outlets of at least one active orifice of the weft inserting comb may intersect each other in one plane which is defined by the axis of the comb and a straight line of the ends of the unthreading gaps of the comb.

An advantage of the present invention consists in that the secondary jets accelerate and reliably direct the weft yarn, the velocity of weft insertion thus being uniform and the negative influence of the unthreading gaps of the weft inserting comb being eliminated or reduced.

The invention will now be described, by way of example, with reference to the accompanying diagrammatic drawings, in which:

Fig. 1 is a partial cross section through a weft guiding comb,

Fig. 2 shows the same weft guiding comb in longitudinal section,

Fig. 3 shows an active tooth of the weft inserting comb with the geometrical arrangement of auxiliary discharging outlets, and

Figs. 4, 5, 6 and 7 show active elements in further alternative embodiments.

A weft guiding comb 1, composed of passive teeth or elements 4 and active teeth or elements 5, is mounted together with its beat-up reed 3 e.g. by means of screws 16 on a known slay 2 of a weaving loom, performing therewith a usual reversing pivotal motion from the weft inserting position, in which the teeth 4 and 5 are located in the shed 7, into the beat-up position, in which the teeth 4 and 5 are moved out of the shed through warp threads 6. A weft inserting nozzle 13 is directed into the axis 12 of the weft guiding comb 1 at least in the weft inserting position.

Thus, the weft guiding comb 1 is formed by an array of teeth 4, 5 each of which is provided with a weft inserting opening 8 having a directing profile and with an unthreading gap 9, as shown in Figs. 1 and 2. In the weft guiding comb 1 are mounted passive teeth 4 and at least one active tooth 5. The latter are distinguished from the former inter alia in that they are provided with auxiliary outlets 10 for additional supply of a secondary entraining medium from a distributing hollow 11, which is fed, usually controlled, from a source (not shown).

For the method for the insertion of weft yarn 14 according to the present invention, it is important how the auxiliary outlet or outlets 10, formed in the zone of the unthreading gap 9 of the active tooth 5, is or are arranged. In Fig. 1, the active tooth 5 is provided with two auxiliary outlets 10,10'm although one of the outlets 10,10' would be sufficient. In Fig. 3, the basic geometrical arrangement of each auxiliary outlet 10 is shown.

Plane ρ is common to axis 12 and a straight line 18 is connecting the ends 17 of the unthreading gaps 9 of the teeth 4 of the comb 1. The perpendicular projection of the axis 15 of the auxiliary outlet 10 onto the plane ρ makes an angle α with the axis 12 of the weft guiding comb 1. The angle α has a value within the range from 0 to 90°, for example between 5 and 30° and preferably 15°.

Plane π is parallel to the axis 12 of the comb 1, and which includes the outlets 10,10'. When the active tooth 5 is provided with two or more auxiliary outlets 10, 10' their axes 15, 15' are advantageously inwardly directed to intersect in the direction of insertion of weft thread or yarn 14 at a point beyond the plane π or in other words the other side of plane π from line 18. In Fig. 4, this arrangement is shown where there are three pairs of the auxiliary outlets 10,10' each pair independently fulfilling this condition and the axes 15 and 15' intersect between plane π and axis 12.

Another alternative embodiment of the present invention is shown in Fig. 5. All axes 15, 15' of the auxiliary outlets 10,10' mutually intersect beyond the plane π or in other words the other side of plane π from line 18 and are toward the inner extremity of the weft inserting opening.

The described embodiments of the present invention may be varied within the scope of the claims. So for instance the axes 15 of the auxiliary outlets 10 may intersect in infinity, i.e. they might be parallel. In the described embodiments, all the active teeth 5 have substantially the same shape as the passive teeth 4 of the comb 1, but this is not essential for their operation. They may, for example, be U-shaped, as shown in Figs. 6 and 7.

During insertion the weft thread 14 (see

Fig. 2) is projected in one of the known manners into the weft guiding comb 1, e.g. by a nozzle 13, which directs a primary carrying jet. The weft thread 14 to be inserted passes as far as the active tooth 5, and is there accelerated by secondary carrying jets from the auxiliary outlets 10, 10' and simultaneously directed into the zone of the weft inserting openings 8 of the comb 1, which is situated opposite to their unthreading gaps 9.

The secondary flow of the secondary carrying jets thus forms a suitable focus of the carrying medium, particularly in a zone remote from the unthreading gaps 9 of the weft inserting openings 8 of the teeth 4, 5 of the comb 1. When a loop is formed on the front part of the inserted weft thread 14, the second flow of the carrying medium also opens this loop and directs it.

Usually, the weft guiding comb 1 is provided with a plurality of active teeth 5, and thus the inserted weft thread 14 is directed from one active tooth 5 to the following one until the thread is directed to the end of the weft guiding comb 1 by means of the last active tooth 5. In this case, it is advantageous when the operation of the active teeth 5 is controlled and the effect of the secondary flow is concentrated at the leading part of the inserted weft thread 14, which is thus pulled by its leading part and passes through the shed 7 in an erect condition. Upon weft insertion through the shed 7, the further weaving phases are carried on in a known manner. The reed 3 beats up the weft thread 14 to the cloth, the weft thread 14 is cut, the slay 2 returns to the weft inserting position and the cycle is repeated.

The present invention might be applied particularly in constructing jet weaving looms of large weaving widths.

WHAT WE CLAIM IS:-

1. A method of guiding weft yarn through a shed by means of a weft guiding comb in a jet weaving loom, in which said weft yarn is projected by a primary flow into the guiding comb, formed of an array of elements provided with weft inserting openings and with unthreading gaps and which is further, in the course of its advancement through said weft inserting openings of the comb elements directed by means of a secondary flow through one or more secondary flow outlets all directed away from the unthreading gaps wherein at least a part of the weft yarn to be inserted is directed by the secondary flow upon its movement through the weft inserting openings of the elements of the comb into a zone of the weft inserting openings opposite to the unthreading gaps and toward the inner extremity of the weft inserting openings.

2. A method of guiding weft yarn through a shed by means of a weft guiding comb in a jet weaving loom, substantially as herein described with reference to the accompanying drawings.

3. A weft guiding comb for a jet weaving loom for carrying out the method according to Claim 1, the comb comprising an array of elements provided with weft inserting openings and with unthreading gaps, one or more secondary flow outlets for forming a secondary flow all directed away from the unthreading gaps so that at least a part of the weft yarn is directed by the secondary flow upon its movement through the weft inserting openings of the elements into a zone of the weft inserting openings opposite to the unthreading gaps and toward the inner extremity of the weft inserting openings.

4. A comb as claimed in Claim 3 wherein the or each secondary flow outlet comprises an outlet on one or more active elements in the array, the or each outlet being provided on at least a part of the boundary of the active element weft inserting openings adjacent its unthreading gap, the axis of the jet of the or each outlet being such that when projected perpendicularly onto a plane ρ which is common to the axis of the comb and a straight line connecting the ends of the unthreading gaps of each element, the projection makes with the axis of the comb an angle α which is greater than 0° and up to 90°.

5. A comb as claimed in Claim 4 wherein the angle α is between 5° and 30°.

6. A comb as claimed in Claim 4 or 5 wherein the angle α is 15°.

7. A comb according to any one of Claims 4 to 6 wherein at least one of the active elements is provided with at least two secondary flow outlets the axes of which intersect, the point of intersection being the far side of a further plane with respect to the unthreading gaps the further plane being parallel to the axis of the comb and which further plane passes through the secondary flow outlets.

8. A comb according to claim 7 wherein there are more than two secondary flow outlets, the axes of the outlets furthest from the ends of the unthreading gap intersechung the far side of the further plane from the unthreading gap.

9. A comb according to any one of Claims 4 to 8 wherein the axes of the secondary flow outlets of at least one active element intersect each other in a plane, defined by the axis of the comb and a straight line connecting the ends of the unthreading gaps of the comb.

10. A weft guiding comb substantially as herein described with reference to and as shown in any one of the accompanying

drawings.

For the Applicants:
LLOYD WISE, BOULY & HAIG,
Chartered Patent Agents,
Norman House,
105–109 Strand,
London WC2R 0AE.

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1547204 COMPLETE SPECIFICATION
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

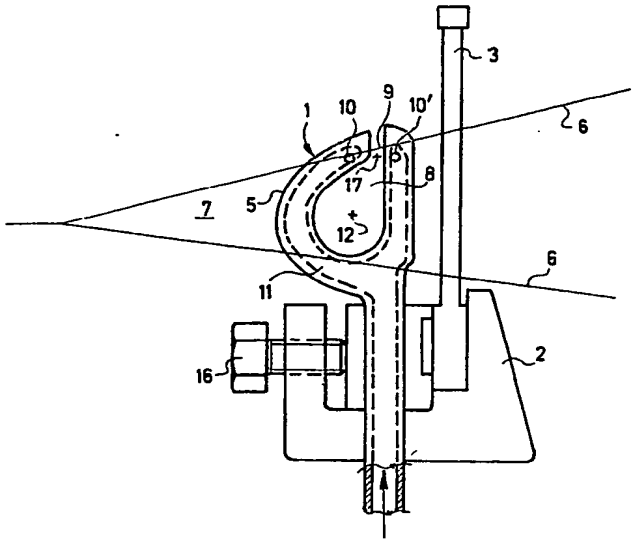

FIG. 1

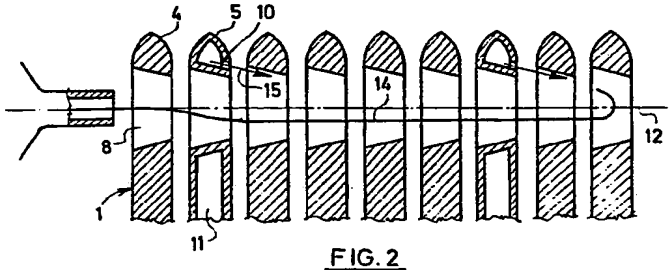

FIG. 2

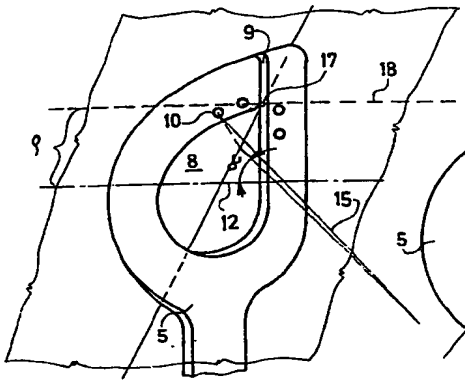

FIG.3

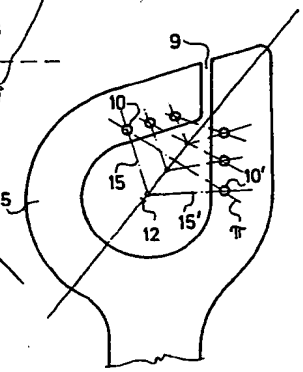

FIG.4

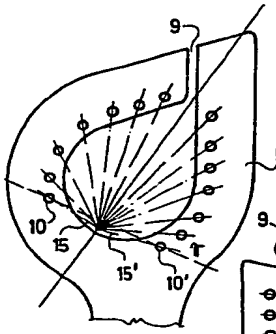

FIG.5

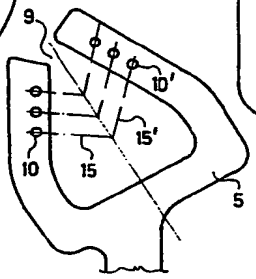

FIG.7

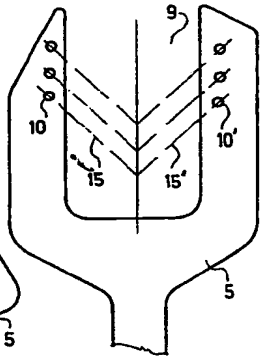

FIG.6